SO414 Homework 1
Due 28 August 2002

1. (3pts) What three variables have the greatest control on the density of the atmosphere?

   _____ _____ _____

2. (3 pts) For each of the above-mentioned variables, state whether it is directly or inversely proportional to atmospheric density.

3. (2 pts) As the depth of the water increases by 12 m, the pressure increases by about _____Pa.

4. (8 pts) Convert the following temperature profiles for seawater (T (C) vs z (m)) to potential temperature profiles (the adiabatic lapse rate of sea water is 0.1C/km):

I.	z	T	II.	z	T
	0	0		0	10
	-1000	10		-1000	0

5. (5 pts) $\theta = T\left(\frac{P_o}{P}\right)^{\frac{R}{c_p}}$ where θ is potential temperature, T is temperature, P_o is a reference pressure level (say 1000-hPa), P is pressure, R/c_p = 0.286. Given the information just presented, show that $g\left(\frac{T_p - T_e}{T_e}\right) = g\left(\frac{\theta_p - \theta_e}{\theta_e}\right)$ where the subscript "e" stands for environment and the subscript "p" stands for parcel. Explicitly state any assumptions you make.

6. USE THE FOLLOWING CHOICES TO ANSWER PARTS B, C, AND D:

   in situ salinity, potential salinity, surface salinity, in situ temperature, potential temperature, surface temperature, in situ pressure, potential pressure, surface pressure

   a. (3 pts) σ is a function of _____, _____, and _____.

   b. (3 pts) σ_t is a function of _____, _____, and _____.

   c. (3 pts) σ_θ is a function of _____, _____, and _____.

d. (2 pts) At the top of the water column, σ ___ σ_t and σ_t ___ σ_θ (use <, >, or =)

e. (2 pts) At the bottom of the water column, σ ___ σ_t and σ_t ___ σ_θ (use <, >, or =)

7. (6 pts) Provide a Charter for your Study Group.